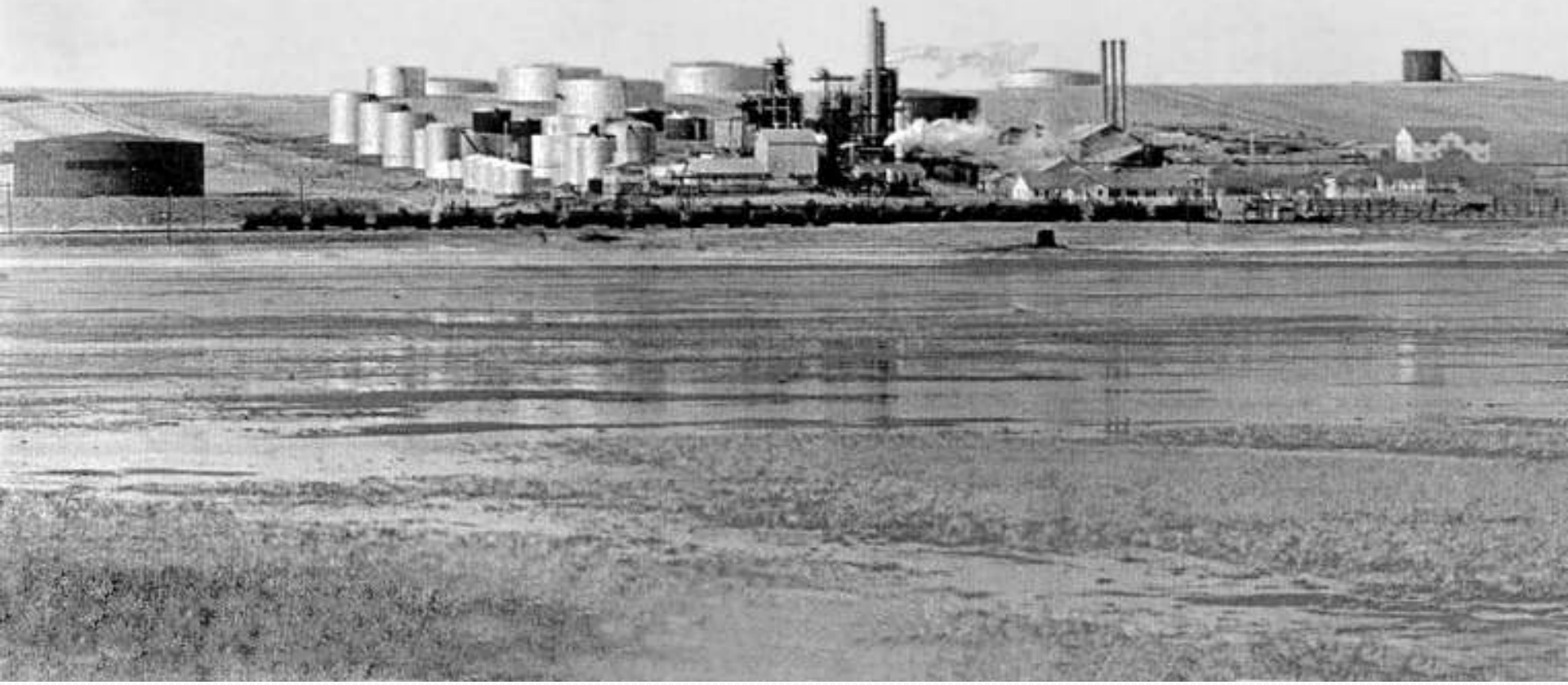


Texaco Sunburst Works Refinery

**DEQ-Sunburst Public Meeting
July 11, 2013**



Introduction

- Chris Cote – DEQ Project Officer – Environmental Science Specialist - Site Response Section
 - 406-841-5078
 - ccote2@mt.gov
 - 1100 N. Last Chance Gulch, PO Box 200901, Helena, MT

Information Availability

- Sunburst DEQ Webpage -
<http://deq.mt.gov/StateSuperfund/sunburst.mcp>x
- Sunburst Public Library – Document Repository
- Public File at DEQ's Remediation Offices – Helena
- Call or email Chris Cote at DEQ

Meeting Format

- Please fill out the “sign-in” sheet
- Talk should take about 40 minutes
- Question and Answer session at end
 - Please hold questions until the Q+A session, Thank you!

Agenda

- Brief Refinery and Environmental History
- CECRA (State Superfund) DEQ process discussion
- Phase II Remedial Investigation Results
 - Everything from 2009 to present, in the town of Sunburst and on refinery property
- Risk Assessment Update
- Feasibility Study Update
- Anticipated Schedule

Refinery Operations and Environmental History

1924 – 2009



History of Refinery Operations

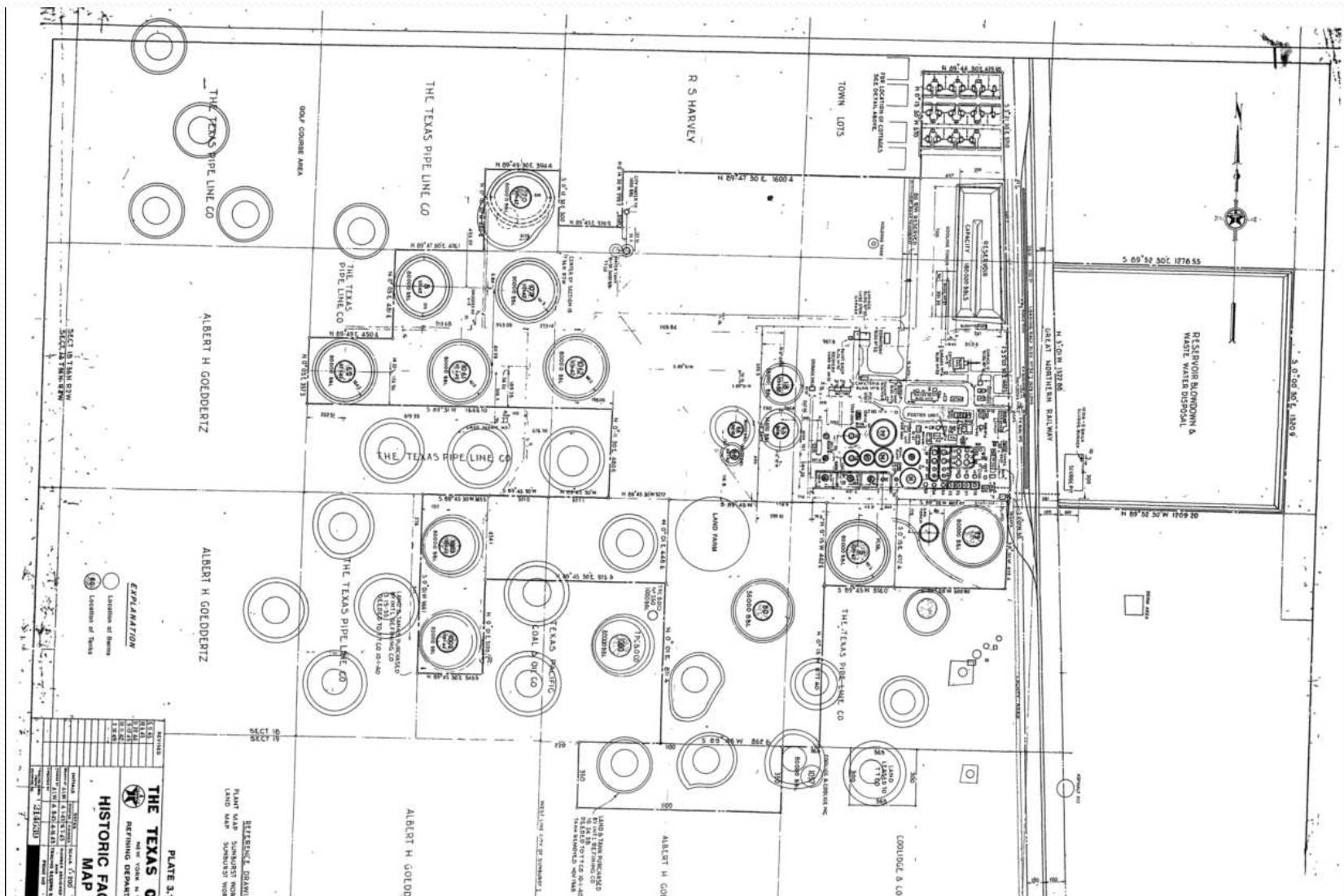
- 1924 - Refinery Built
- 1926 - Refinery Operational – 800 barrel per day capacity
- 1955 - Basement of House explodes in Town from petroleum vapors attributed to pipeline leak
- 1955 to 1957 - Texaco Recovers 182,448 gallons of petroleum/water, monitoring continues until 1973
- 1957 - Peak year for refinery, production of 8000 barrels per day (336,000 gallons per day)

History of Refinery Operations

- 1961 - Refinery shuts down and sells property and equipment to Pacific Hide and Fur
- 1967 - Pacific Hide and Fur sells property to private individuals



Former Refinery Construction



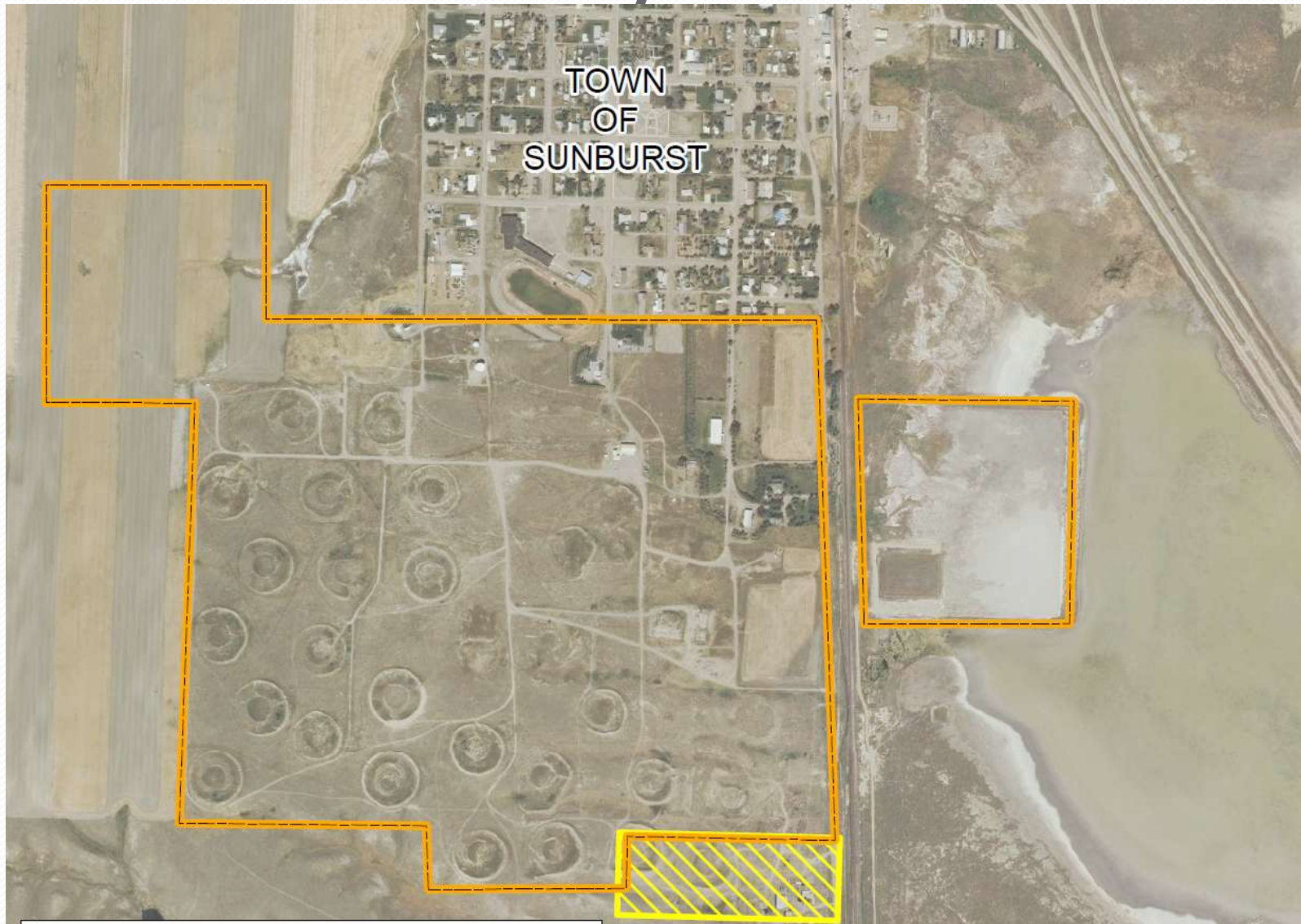
Aerial Photo of Refinery - 1941



Photo of Refinery - 1953



Former Refinery - 2012



Environmental Investigation History

- 1984 EPA Federal Superfund (CERCLA) Assessment
- 1989 Listed with State Superfund (CECRA)
- 1989 Administrative Order on Consent Signed between DEQ and Texaco
- 1990 - 2003 Various Investigations and Voluntary Cleanup Plan
- 2001 Chevron merges with Texaco and assumes responsibility for cleanup
- 2001 Groundwater Sampling and Analysis Plan implemented

Environmental Investigation History

- 2003 VCP completed, Yearly Inspections of on site repositories
- 2003 DEQ's Proposed Plan Issued
 - DEQ receives data from 3rd Party Investigations during public comment period
- Based on DEQ's analysis of 3rd Party Data, DEQ requires additional investigations
 - Ultimately DEQ requires an extensive Phase II Remedial Investigation, revised Risk Assessments and Feasibility Study

Voluntary Cleanup Plan (1999 – 2003)

- Petroleum and lead contaminated soils and refinery construction demolition are placed into (3) on-site repositories
- Landfills continue to be inspected annually



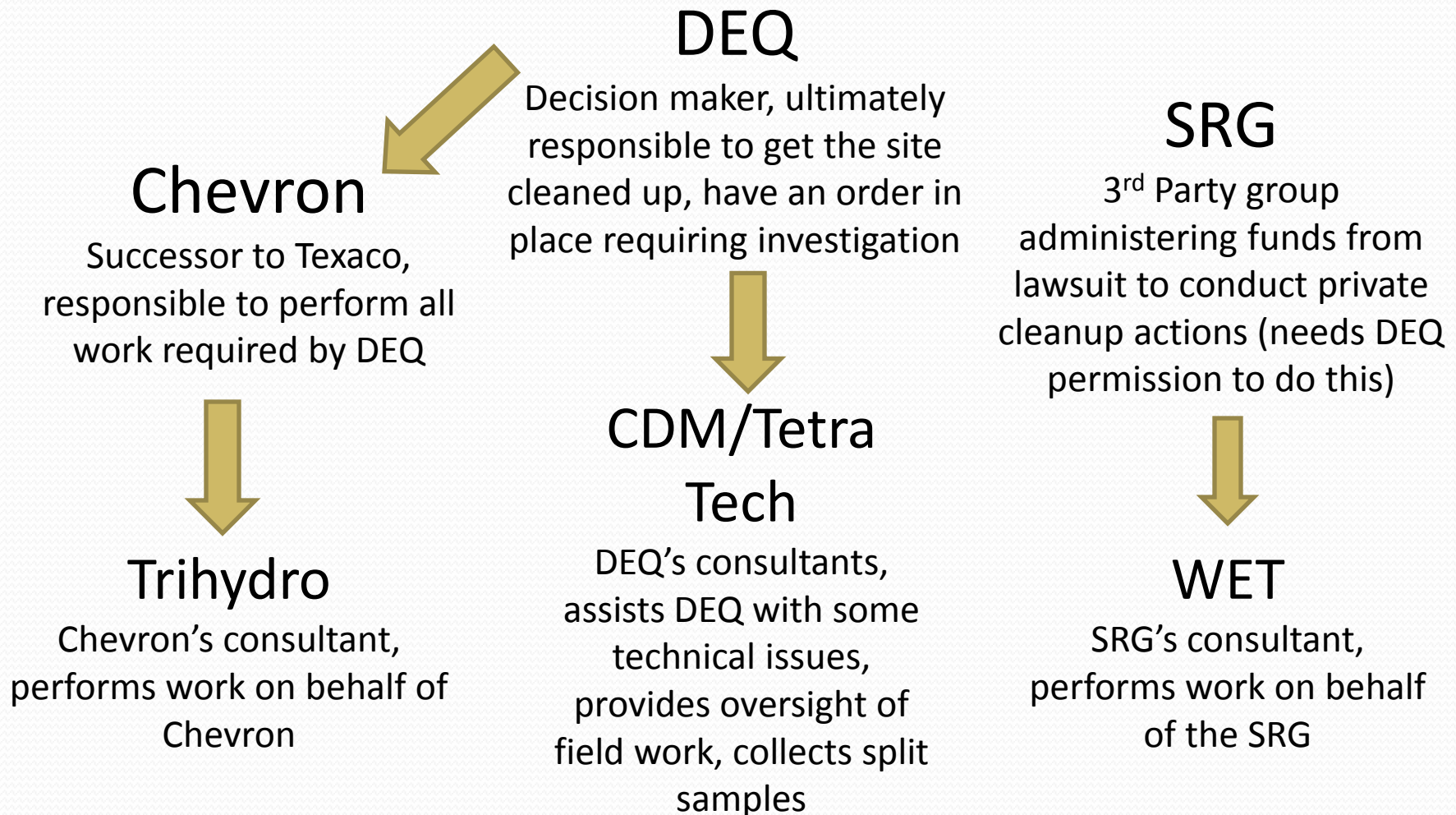
Former Groundwater Monitoring Program



CECRA Process – Path Forward

- **Remedial Investigation** – Find all the contamination, understand how it got there (known as a Conceptual Site Model); also collect data to help with cleanup options
- **Risk Assessment** – Does the contamination pose a threat to human health or ecological receptors?
- **Feasibility Study** – Evaluate different methods to clean up the contamination to levels determined in Risk Assessment
- **Proposed Plan** – DEQ's selection of how to clean up the contamination
- **Record of Decision** – DEQ's final plan to clean up the site, takes into account public comment
- **Final Cleanup Conducted** – DEQ continues to oversee cleanup until cleanup levels are met

Who's doing all this?



Phase II Remedial Investigation (RI)

2009 - 2012



Phase II RI Goals

- Define the nature and extent of contamination from the former refinery in soils, groundwater, surface water, sediment, and air
- Develop a robust Conceptual Site Model
- Identify needs for interim actions and complete
- Collect data to direct risk assessments and feasibility study



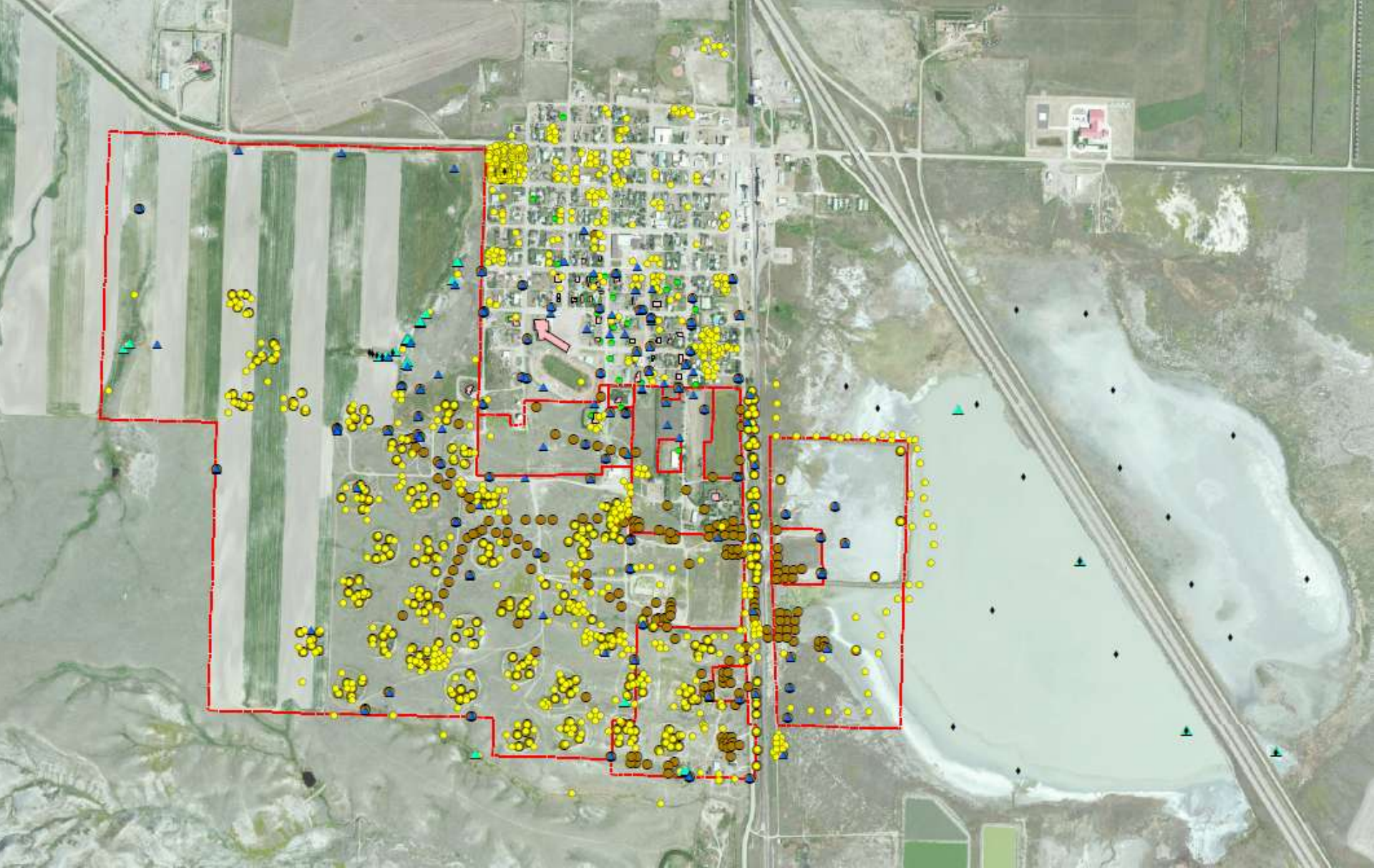
Investigation Areas Summary

- Vapor Intrusion sampling (48 structures total)
- Residential soil sampling (65 properties)
- Shallow and Deep groundwater contamination defined
- Free product delineation
- All soils in refinery operation areas thoroughly sampled
 - Particular focus on tank berms, tank farm, pipelines, asphalt/cinder areas, wastewater and process areas
- VCP excavation areas resampled
- Surface water drainage areas sediment and surface water
- Railroad loading rack investigations
- Coolidge and Coolidge refinery investigation
- Wastewater disposal area and lakebed
- Groundwater pumping tests

By the Numbers.....

- Facility size: >300 acres
- 3,275 Soil Samples
- 628 Groundwater Samples
- 60 Surface Water Samples
- 47 Sediment Samples
- 564 air or soil vapor samples
- >16,000 field screenings for lead
- Hundreds of soil borings and monitoring wells



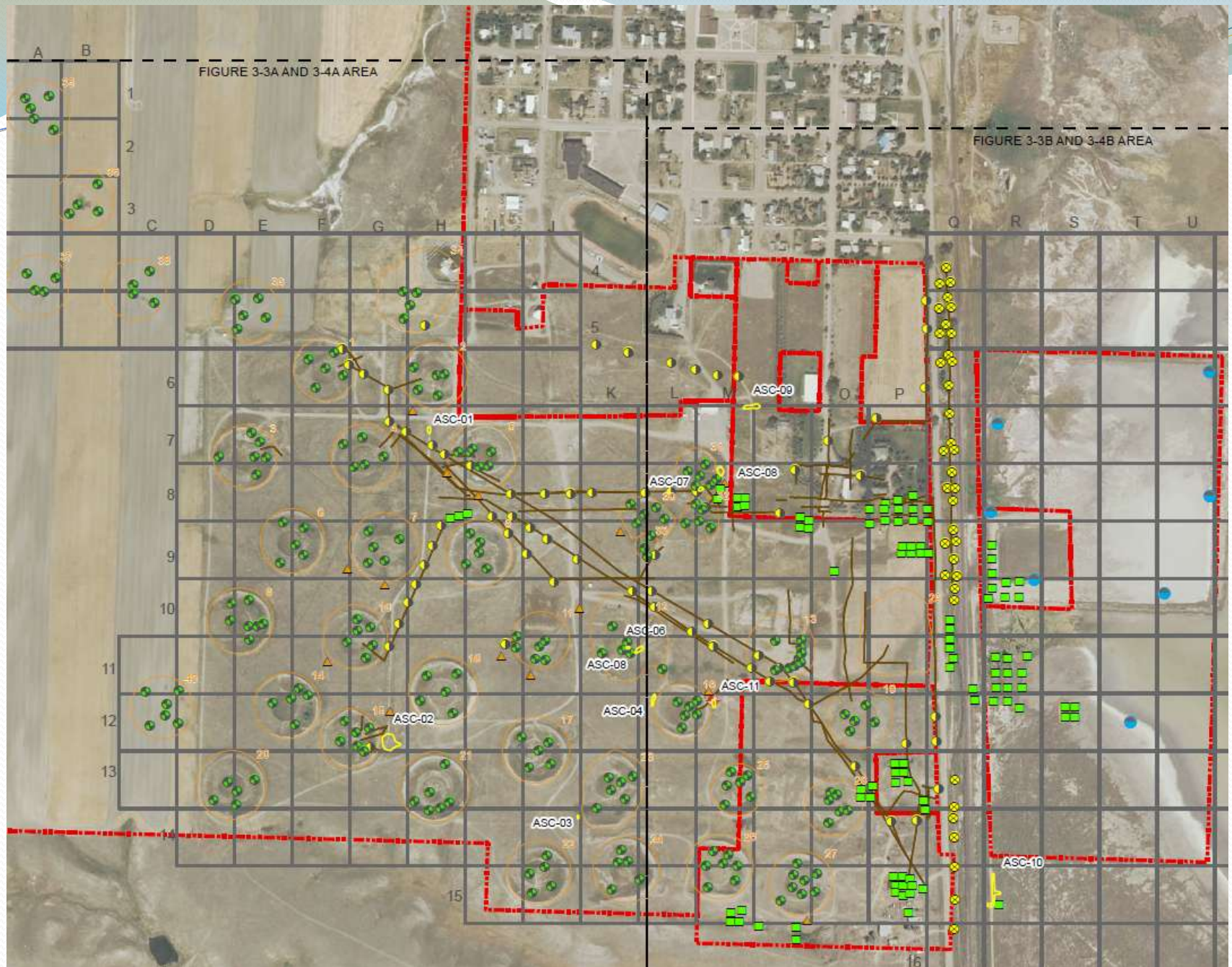


Sample Locations Summary – Many locations depicted have multiple samples collected

Refinery Soils Sampling

- Tank Berms, Pipeline Corridors, VCP excavation areas, Tank Farm, Asphalt/Cinder Areas, Railroad loading racks are targeted
- Surface soils (0-2') and subsurface soils (>2') sampled
- Field screening conducted on samples with XRF and PID/FID field instruments
 - Measure concentrations of metals and volatile organic compounds in soils
 - Field screening results supported with laboratory analytical data

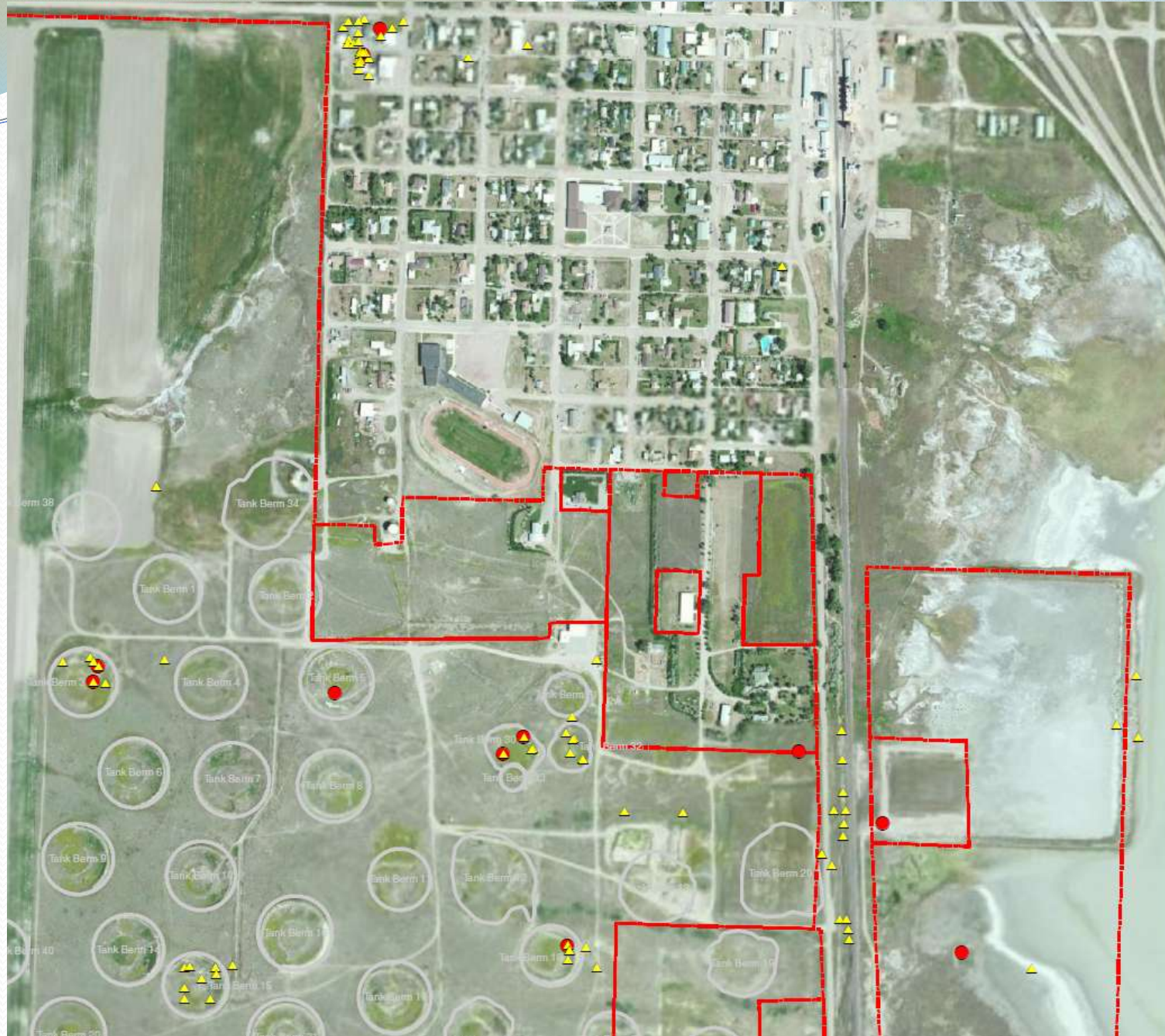




All Subsurface Soil Sample Locations for Refinery Features Investigation



Organic Compounds above screening levels – Surface and Subsurface Soil



Lead above screening levels – Surface and Subsurface Soil

Residential Soil Sampling

- 2008 - One house (built in a former tank berm) found to have refinery soil contamination (lead)
- 2009/2010 – Two additional properties found to contain lead contaminated refinery soils
- 2011 – Phase II RI expanded to include soil sampling of 65 properties in town



Properties Sampled

- 65 separate properties falling into 4 categories:
 - Suspected to have refinery soils
 - Known to have backfill, but unknown source
 - Known to have backfill, potential alternative source
 - Random sampling





Tank Berm 3 Location



Tank Berm 3 – High levels of lead and missing soil!

Residential Soil Sampling Results

- In total, 5 properties were found to contain lead contaminated soils from refinery
 - Source of contamination was transportation of soil from tank berm 3 for use as backfill
- These 5 properties have all been remediated by removing contaminated soils and replacing with clean fill
 - Contaminated soils transported to refinery property stored in a bermed area, covered with clean fill and plastic sheeting
 - Final relocation of these soils to be selected in Proposed Plan
- 3 Properties with very small area of impacted soils remaining to be cleaned up this summer (July/August)
 - Unclear if this is refinery related or not

TOWN
OF
SUNBURST

I-15

Soil
Stockpile



Soil Removal in Progress.....

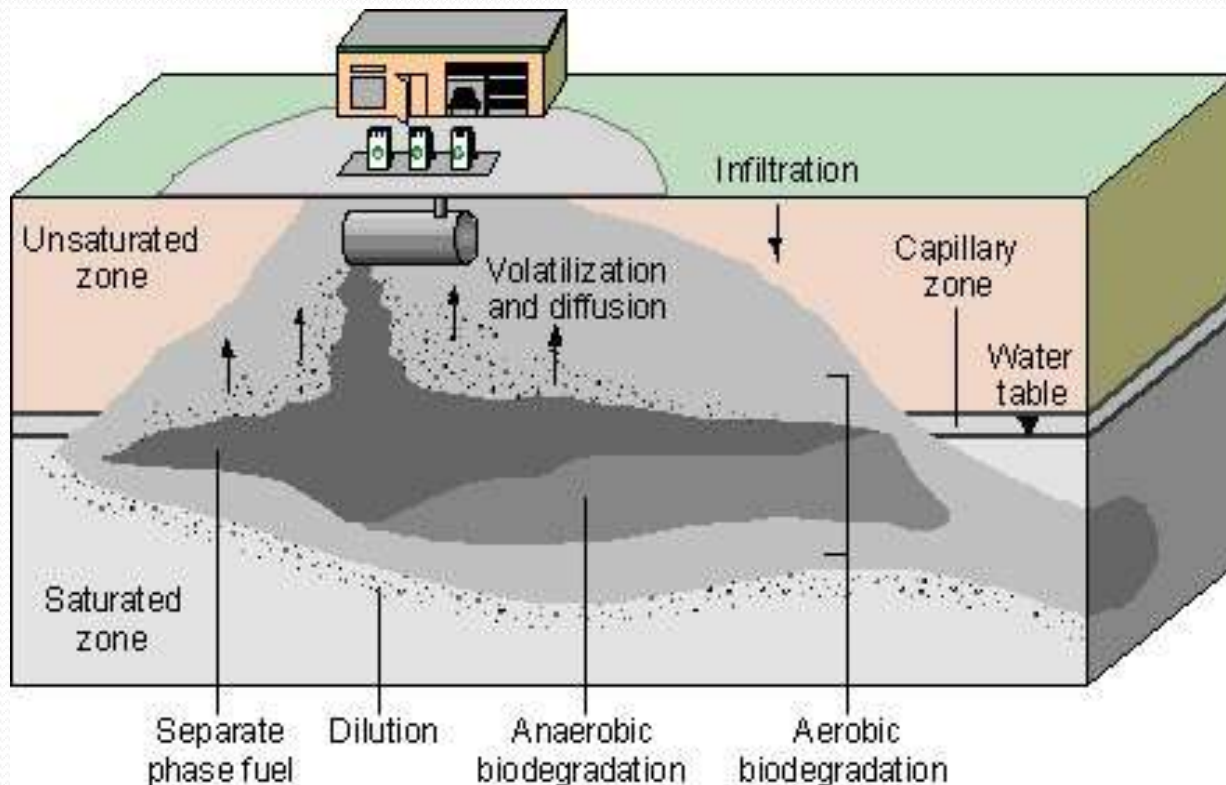


Soil replacement and re-landscaping



Groundwater Contamination

- Delineate the extent of contaminated groundwater
 - Shallow and Deep Aquifers
- Understand contaminant transport mechanisms



Previous Understanding of Groundwater Contamination

- Based on assumptions that the only source of groundwater contamination was the 1955 pipeline release and that groundwater only flows to the northeast/east





Groundwater Monitoring

- Groundwater Monitoring program has been substantially revised
 - Monitoring well network expanded
 - Groundwater contaminant list expanded
 - Sampling changed from quarterly to semi-annually (April and October)



Free Product Update

- Free Product or Petroleum floating on top of the groundwater table continues to exist on and adjacent to former refinery property
- DEQ requires ongoing recovery of free product via active and passive recovery methods
- Since December 2007, more than 900 gallons of free product have been removed from below ground



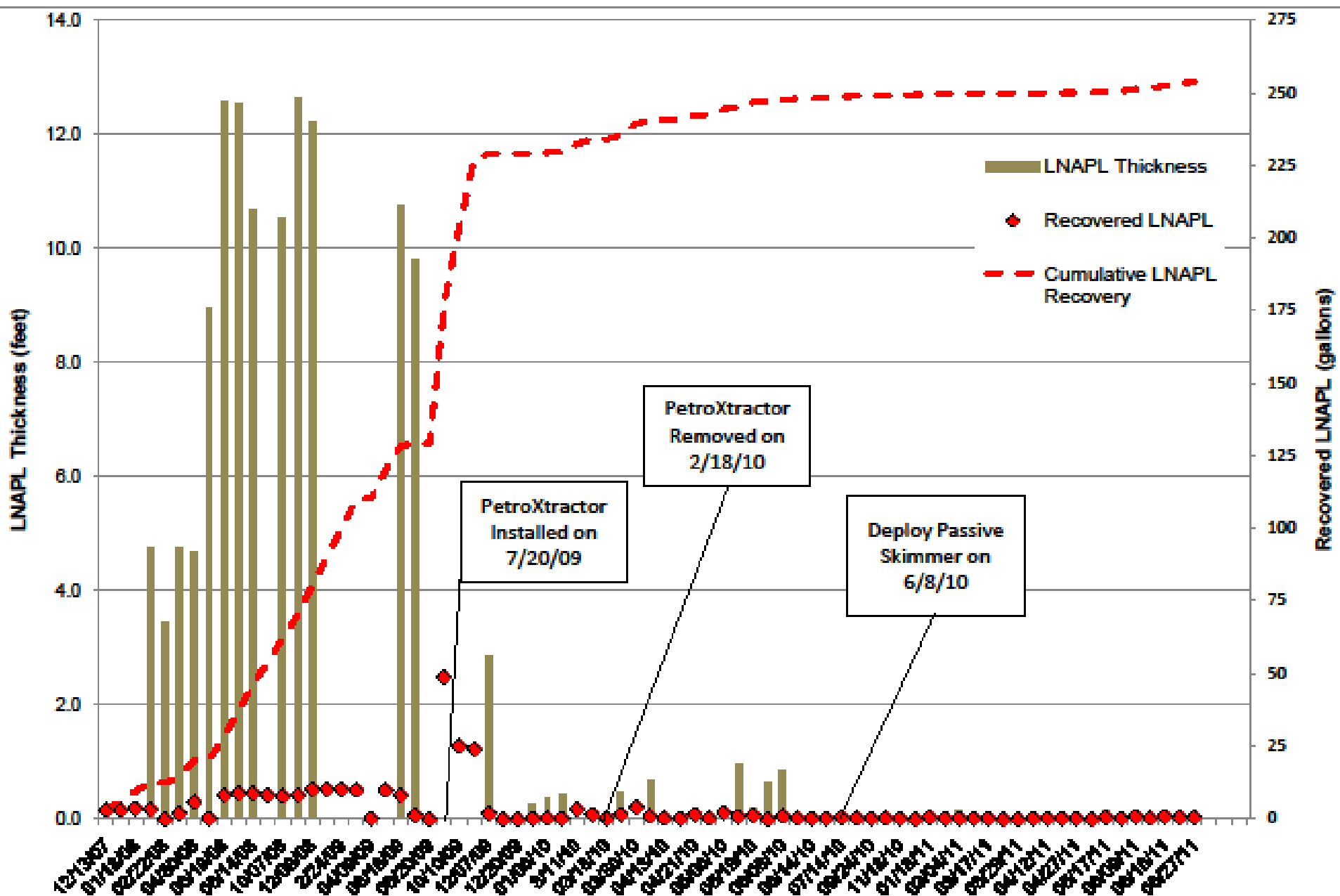


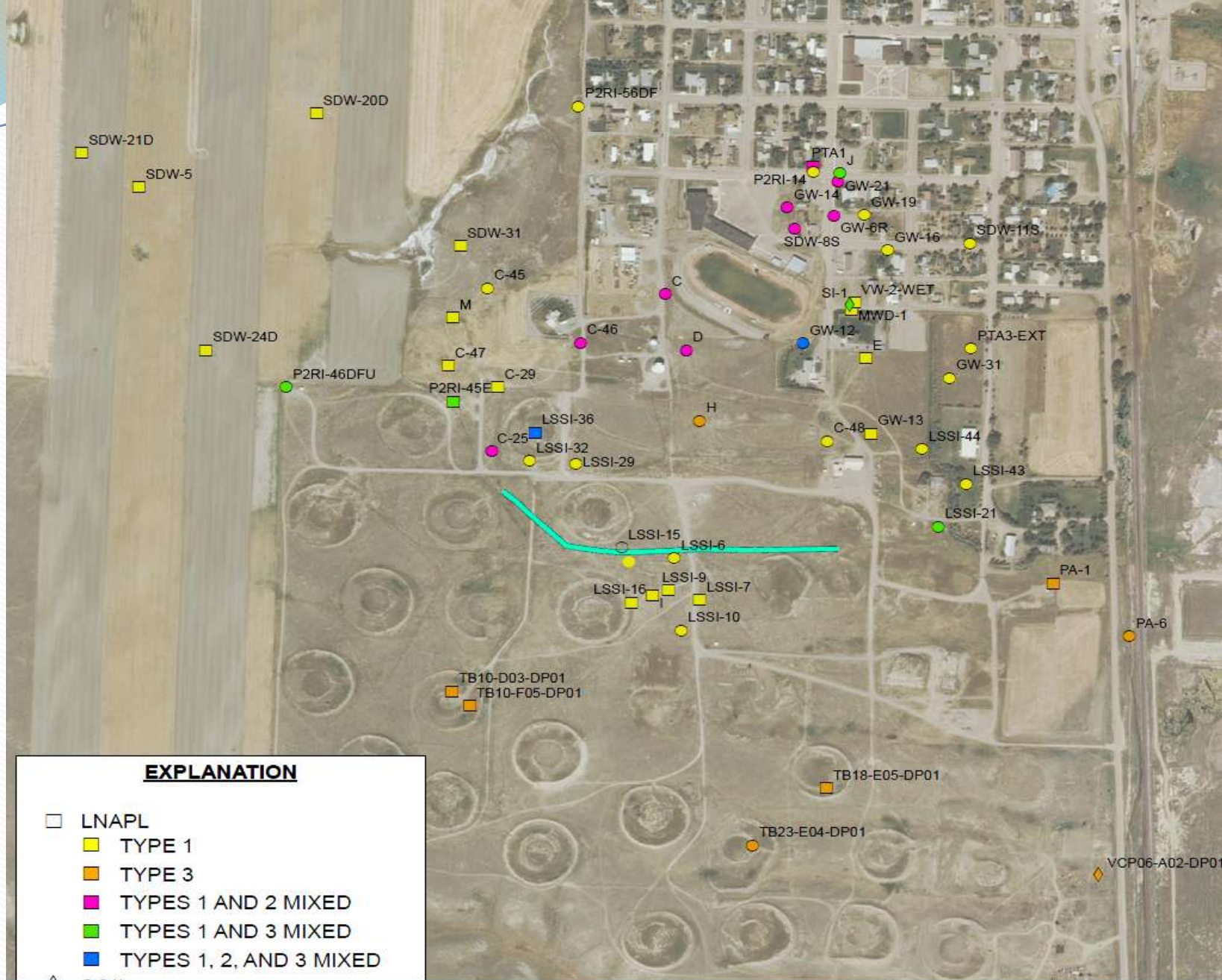
← Active Recovery System

Passive Absorbent
“socks”



**FIGURE 5. RECOVERED LNAPL AND LNAPL THICKNESS SUMMARY, PA-1
FORMER TEXACO SUNBURST WORKS REFINERY, SUNBURST, MONTANA**

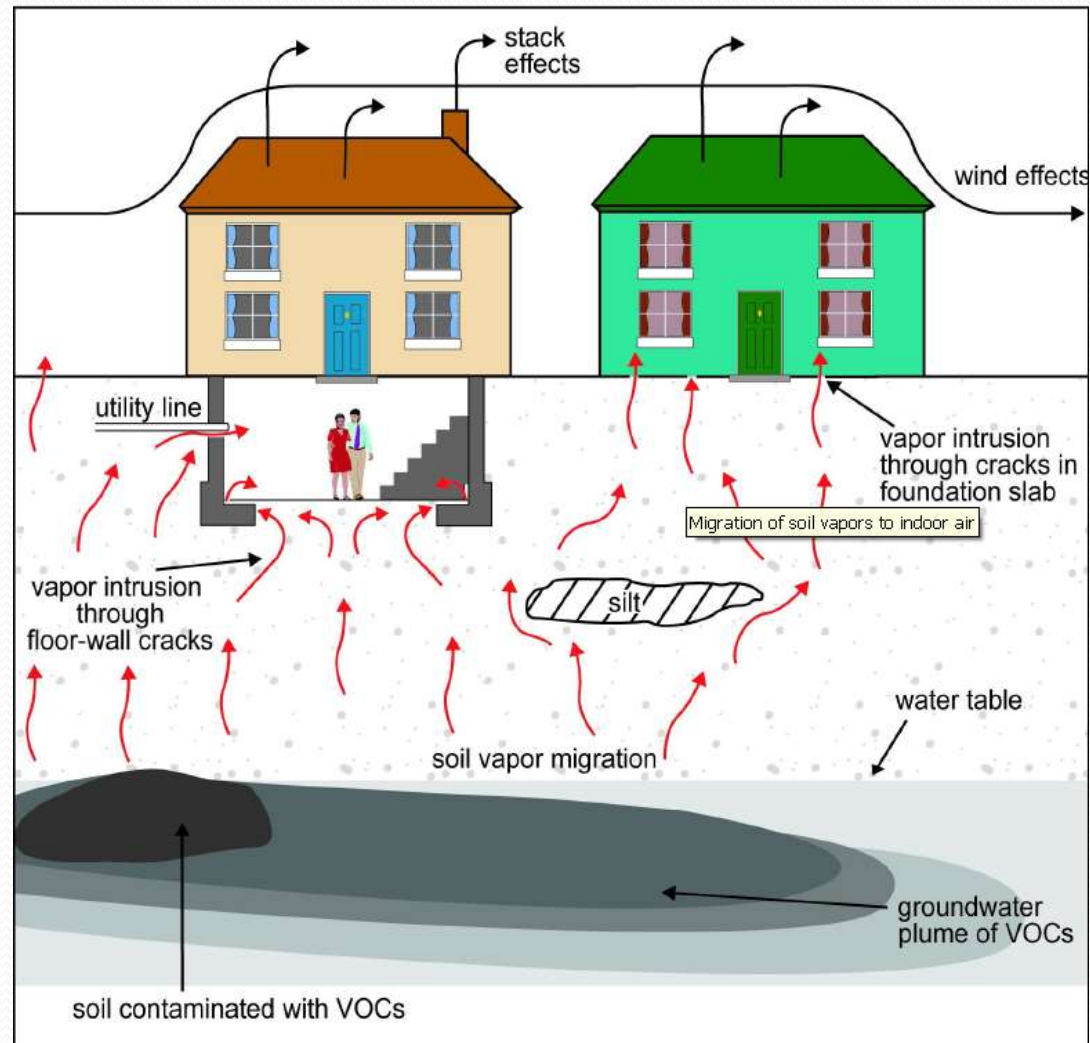




Petroleum Hydrocarbon Fingerprinting

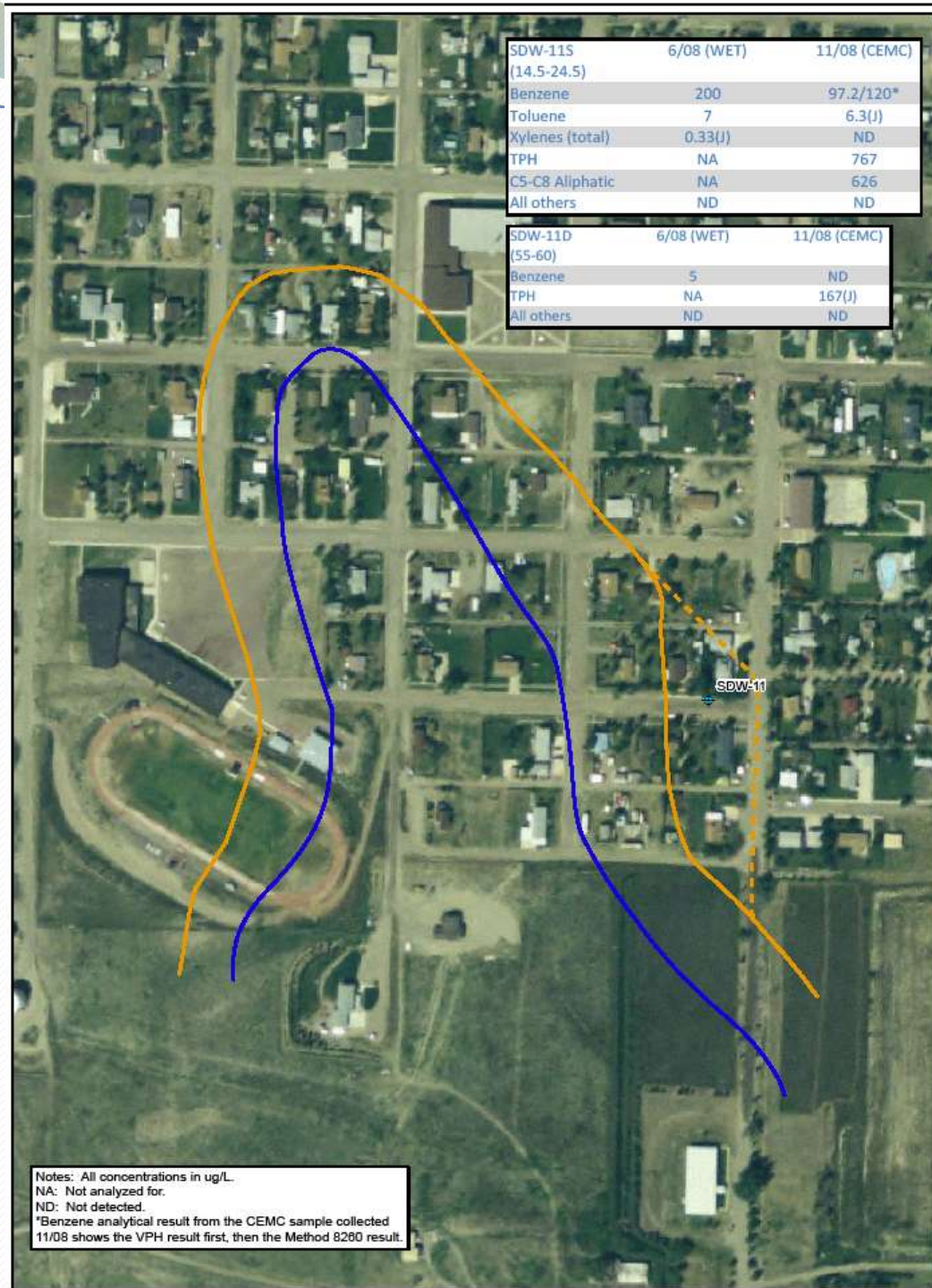
Vapor Intrusion (VI)

- The migration of contaminated soil vapors from a subsurface source to the indoor air of overlying or adjacent buildings



VI Investigation Area (2009-2010)

- 100 foot buffer from edge of contaminated groundwater plume
- All samples collected during winter “worse-case” time period
- Samples collected for VOCs and petroleum fractions



VI Investigation Findings

- Both schools, Church on the Rock, and all but ONE residence found to have INCOMPLETE VI Pathways
- Background concentrations of VOCs in houses consistent with background concentrations observed statewide in a Montana 2012 Study
- ONE residence with complete VI pathway mitigated to prevent VI from occurring



Sub-Slab Depressurization System

(commonly called a radon mitigation system)



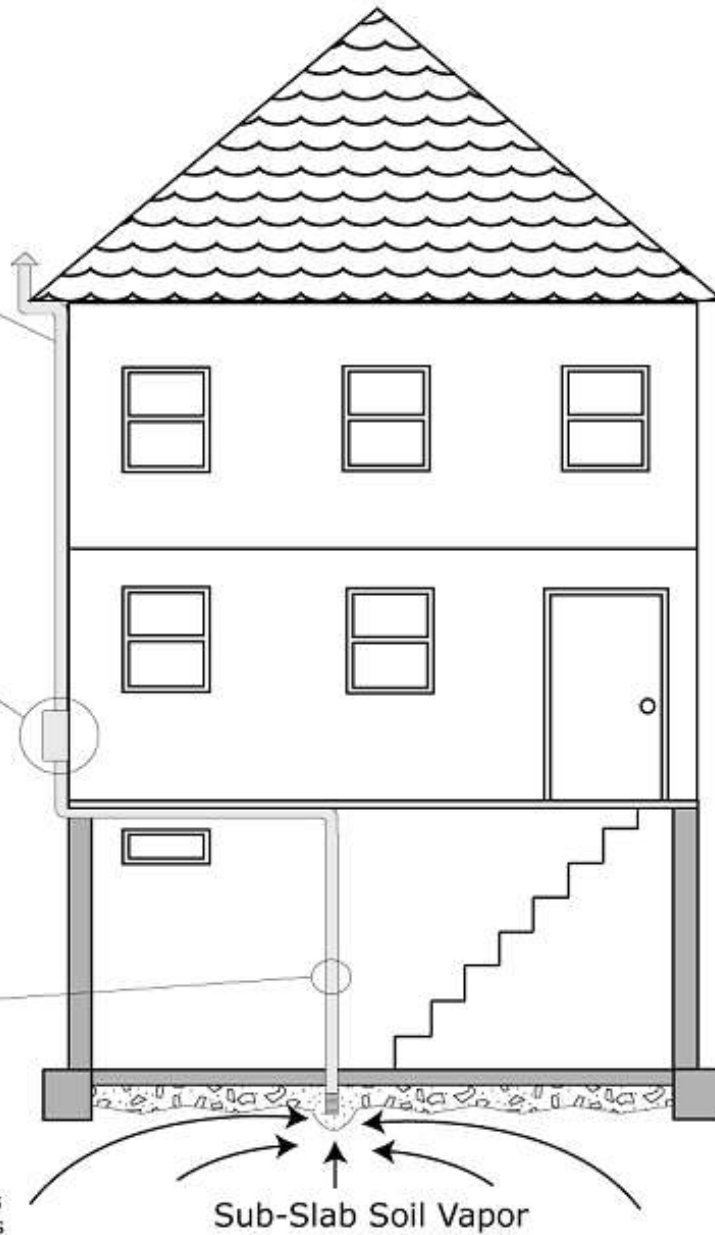
The vent pipe is routed up the side of the structure to a location above the roof line.



A fan is used to draw soil vapor from beneath the slab.



A liquid gauge, or manometer is used to verify that the system is operating properly



A sub-slab depressurization system vents contaminated soil vapor before it enters a structure. The fan draws vapor from beneath the building outside to the roof line where it is released to the outside air.



Carbon Drum to
treat effluent soil
vapor before
venting

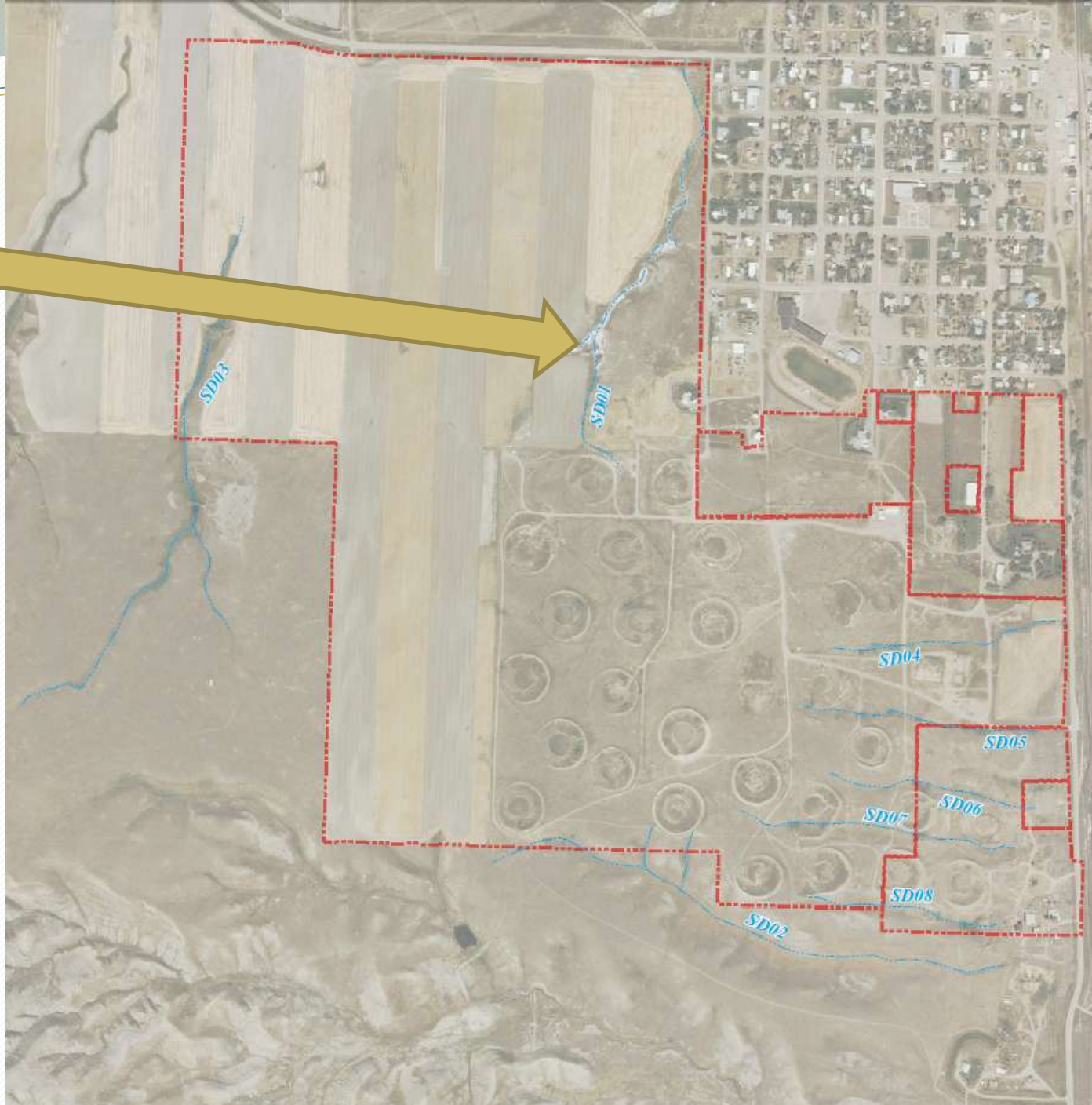
Surface Water Drainage Sampling

- 8 Separate surface water drainages from former refinery
- ONE drainage (SD-01) is connected to shallow groundwater table
- All other drainages only contain water during precipitation
- Only drainage that shows refinery impacts is SD-01 (lead and petroleum compounds)



Southeast
area of SD-01
Drainage

Benzene and
Total
Petroleum
Hydrocarbons
above DEQ
standards,
lead in
sediment
above EPA
RSLs



Wastewater Area and Ephemeral Lake

- Elevated levels of lead in sediments and surface water
- Correlation observed with location of culvert from wastewater discharge bermed area
- Ecological Risk Assessment underway

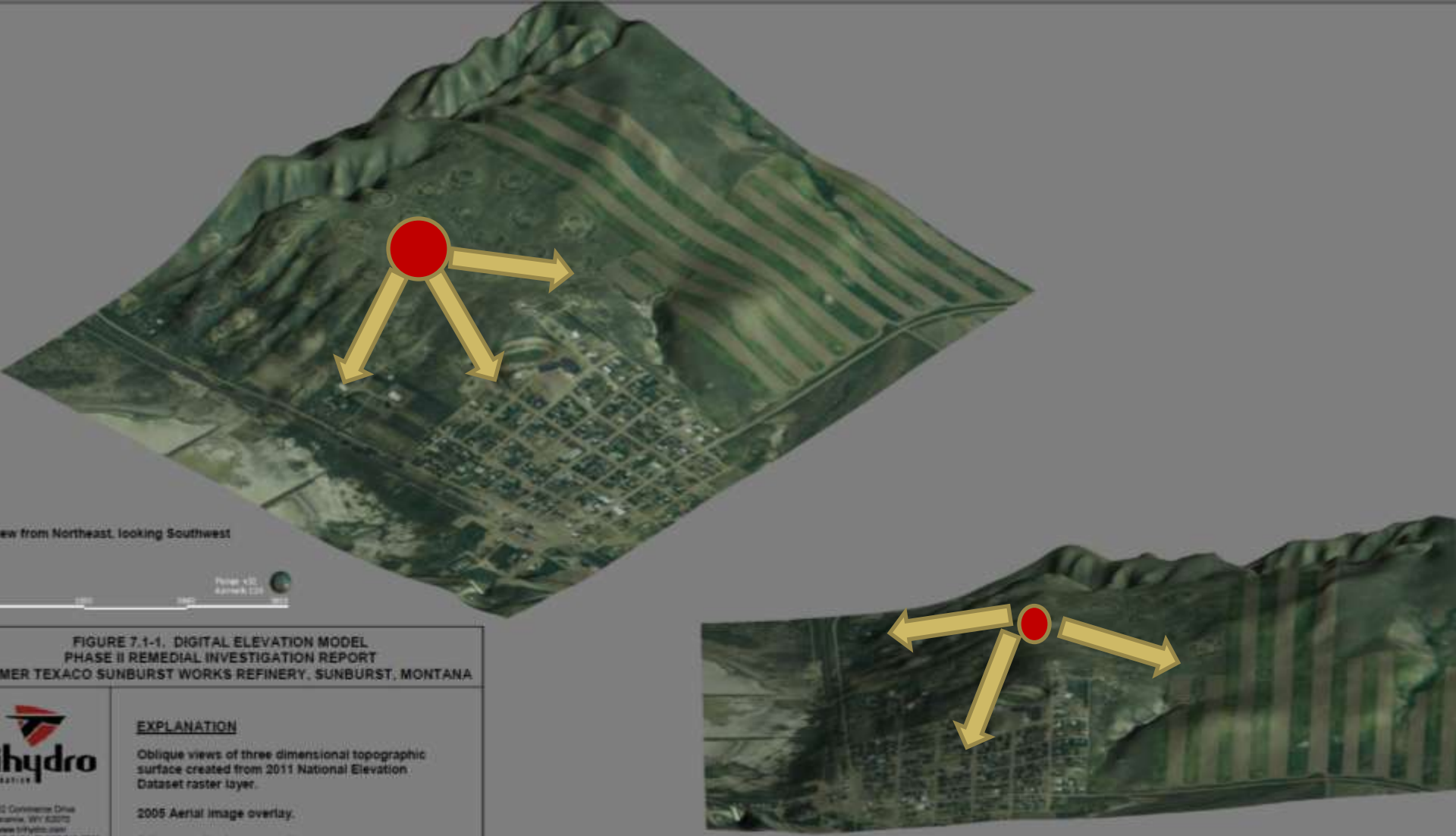


Conceptual Site Model

- Spills of petroleum from storage tanks, pipelines, and loading racks have resulted in lead contamination in soils/sediments and petroleum contamination in groundwater
- Groundwater travels from northern refinery property to north/northeast and also north/northwest (around topographic high near town's water storage tank)
 - Flow is to the east in the southern refinery property
- Predominant zone for contaminated groundwater transport is highly fractured/weathered shale layer
 - In places this zone is under significant hydraulic pressure
 - Wells screened between this zone and overlying soils may allow contamination to travel vertically upwards

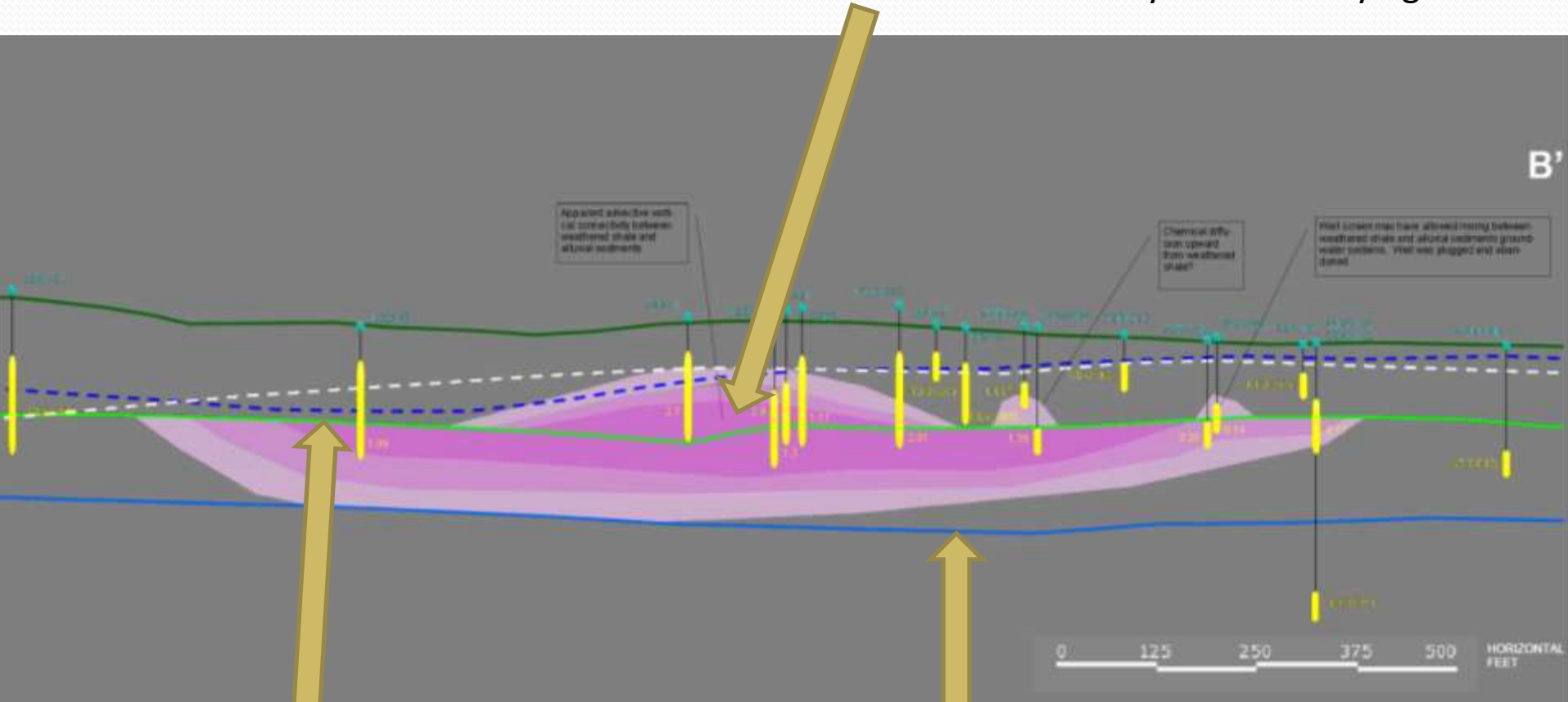
Conceptual Site Model

- Surface water/sediments in lakebed and drainage SD-01 (west of town) contain refinery related contaminants
- Vapor Intrusion pathway is incomplete (except one structure that was mitigated in 2009)
- Surface soils in town only show refinery impacts in cases where contaminated refinery soils were transported there as backfill
 - 5 properties have been remediated, no more impacted properties are known



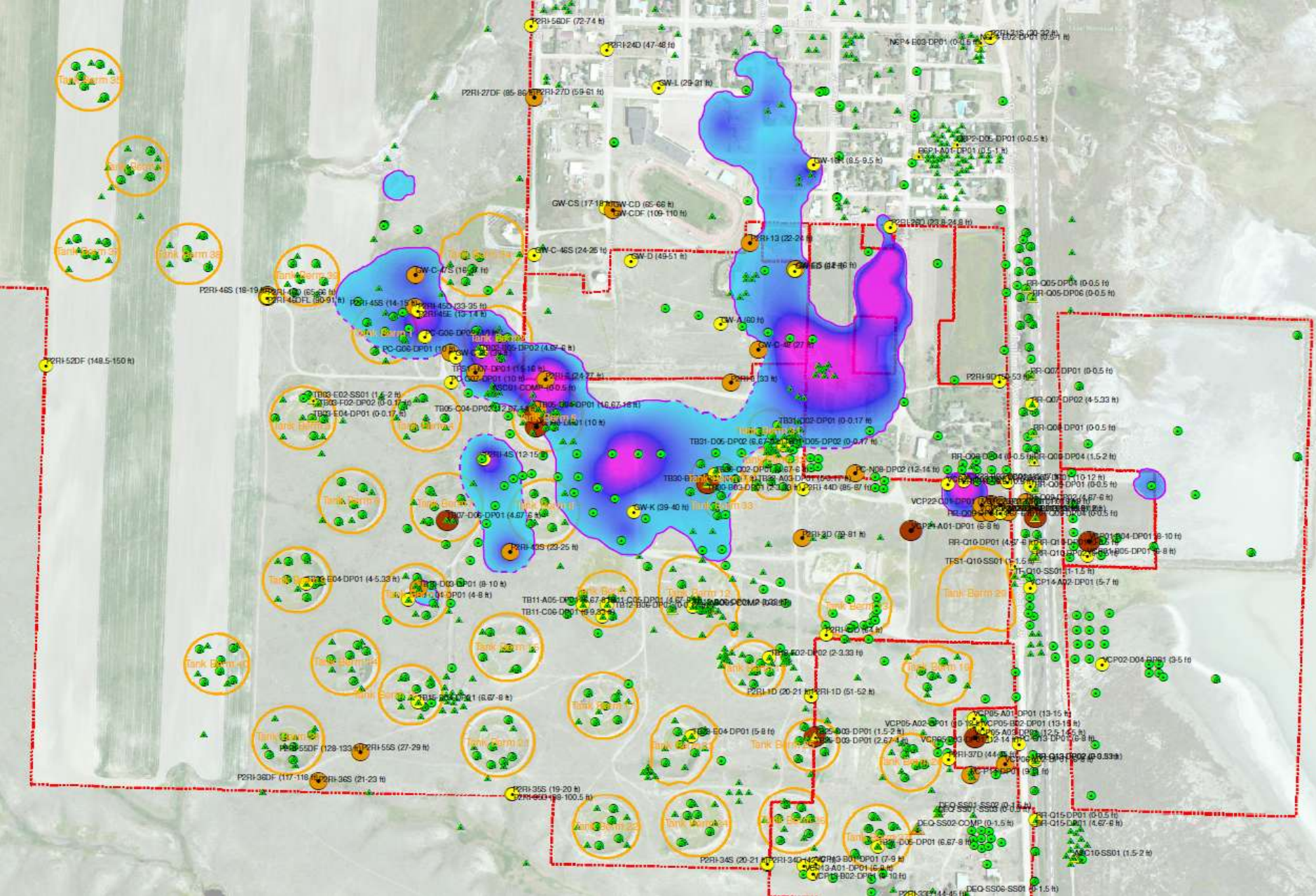
Approximate Location of large volume pipeline release and groundwater migration route

Contamination traveling vertically upwards due to wells screened between weathered shale layer and overlying soil



Green line = top of weathered shale

Blue line = top of competent shale



Groundwater TPH impacts and soil leaching to groundwater exceedences

Human Health and Ecological Risk Assessments

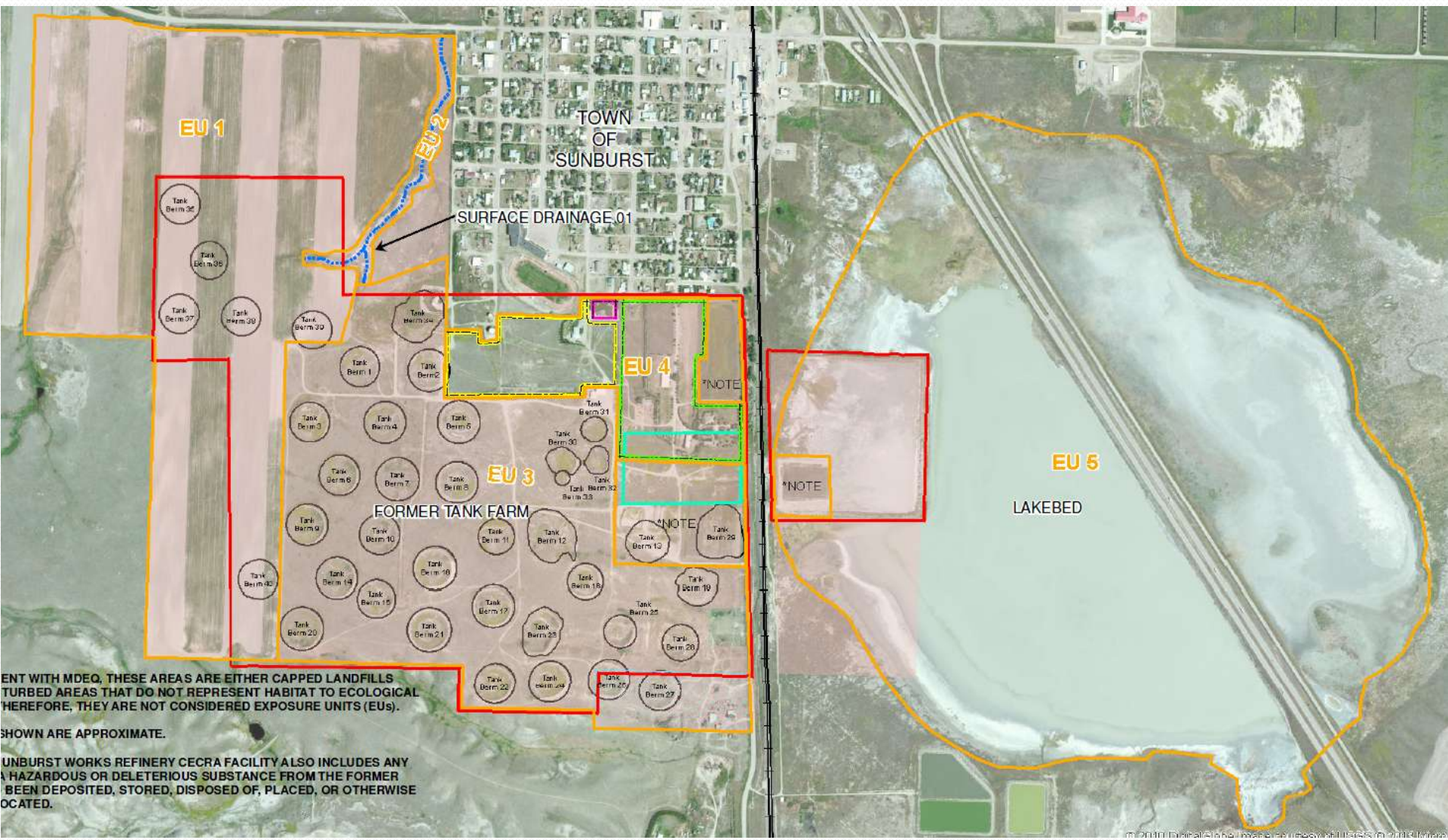
2012-2013



Ecological Risk Assessment

- Determine cleanup levels protective for most sensitive ecological receptors for sediment and soil
- Risk Assessment conducted per EPA Guidance
- All areas of refinery split evaluated in separate exposure units
 - Major focus on lakebed and drainage SD-01 since these are wetlands
- Representative sensitive species selected in each area
- Conservative exposure assumptions
 - For example, lakebed only contains water for small portion of year, but use assumption that it always contains water

Ecological Risk Assessment Exposure Areas



Human Health Risk Assessment

- Determines cleanup levels for surface and subsurface soil based on risk posed to humans from exposure to known levels of contamination
- Most groundwater cleanup levels are set in Circular DEQ-7 Montana Numeric Water Quality Standards (October 2012)
- Conservative assumptions used in risk assessment regarding receptors and exposure duration
 - Designed to be protective for most sensitive populations
- Risk Assessment approach is consistent with EPA Guidance

Risk Assessments Status

- Risk Assessment work plan for Ecological Risk Assessment received and comments prepared by DEQ
- Human Health Risk Assessment work plan to DEQ July 2013
- Both Human and Ecological Risk Assessment Reports should be finalized in 2013

Feasibility Study and Path to Final Cleanup

2013 -



Feasibility Study (FS)

- Evaluates all available technologies to clean up contamination identified in the Remedial Investigation, and determined to exceed cleanup levels in risk assessments
- Technologies may be “pilot-tested” to test effectiveness in the field
- Focus will most likely be testing technologies to clean up groundwater contamination and remove free product
- DEQ sent Scope of Work Requirement for Feasibility Study
 - First step in this process – Initial Alternatives Screening Table has been received by DEQ
- Anticipate field work associated with FS to begin late 2013/early 2014

Schedule to Determine Final Cleanup

Phase II Remedial Investigation Complete (2012)



Phase II Remedial Investigation Report Approved (2013)



Ecological and Human Health Risk Assessments Approved (2013)



Feasibility Study Work Plan – Pilot Testing of Selected Technologies
(2013/2014)



Feasibility Study Report Approved (2014)



Proposed Plan for Final Cleanup prepared by DEQ (2014/2015)



Public Comment on Proposed Plan and Final Record of Decision Issued by
DEQ (2015)

Public Information

- DEQ will continue to provide regular updates to the town of Sunburst as cleanup process continues
- DEQ's Sunburst website and document repository at Sunburst library regularly updated with new documents
- DEQ will hold another public meeting to present results of risk assessments and feasibility study

Thank you for Attending.
Questions?

